

Operational Description

General Description

Magnetek's licensed transmitter board is a 100mW data transmitter. The board is configured for 100mW output power and any four frequencies in the 72-76 MHz range. One of four channels is user selectable via jumpers on the board.

Logic level data, at either 2400 or 4800 baud, is accepted from the companion CPU board and modulated on the RF carrier using frequency-shift keying (FSK), with a +/- 3 kHz deviation. In addition, the RF output may be keyed on and off to send individual data packets. This allows up to four users on a single channel.

Data is FSK modulated on a carrier frequency of 72-76 MHz. RF duty cycle can be up to 100% and a maximum of 128 bits can be transmitted per transmission.

Circuit Description

Voltage Regulation

The transmitter board will operate over the range of 4.5-9.8V or 10-15V depending on the jumper selection made. The jumpers select which main switching regulator is used to generate 3.6V, used for the transmitter line-up. Following the main regulator is a linear regulator that further decreases the voltage to 3.3V, to power the remainder of the circuits on the board.

Modulation

The modulation is set and limited by adjusting the two digital to analog converters (DAC), U8-A and U8-B. These DAC outputs are switched (analog switch, U6) in cadence with the incoming data and passed through a 4-pole, 3.25 kHz, Butterworth low pass filter. This filter limits the harmonic content of the baseband data.

The filtered data is then sent to the synthesizer's reference oscillator, which modulates the voltage-controlled oscillator (VCO). Since the synthesizer loop bandwidth is 1 kHz, any modulation applied to the reference oscillator would see a low pass response with cutoff at 1kHz. To obtain modulation components above the 1 kHz cutoff, modulation is also applied to the VCO. The VCO response will be a high pass with cutoff at 1 kHz. This is generally referred to as two-port modulation. The modulation flatness adjustment (R44) will match the modulation sensitivity of the two ports.

Amplifier Line-up

The buffer amplifier (Q9) follows the VCO and provides reverse isolation to prevent unwanted modulation of the VCO. The buffer amplifier drives the pre-driver, which can be keyed on and off to send data packets.

Following the pre-driver is the 100mW driver. This is a class C amplifier that suffices for a final amplifier in the 100mW version. The amplifier is followed by a 7-pole Chebyshev low pass filter. This filter rejects harmonics of the carrier.

Micro-controller

The micro-controller provides the following functions:

- 1) Reads the channel jumpers and sets the synthesizer to the appropriate channel and at the same time sets the channel's respective output power and deviation settings.
- 2) Communicates with an external computer through connector J4 to set the frequencies for, up to, four channels. This would include deviation settings and output power settings on these channels.

Antenna

An external PCB antenna with a gain of -33.6 dB is used with the transmitter and is connected by an RF MCX connector.